SLOVENSKI STANDARD
oSIST prEN ISO 23625:2024

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Mala plovila - Litij-ionske baterije (ISO/DIS 23625:2024)

Small craft - Lithium-ion batteries (ISO/DIS 23625:2024)

Kleinfahrzeuge - Lithium-Ionen-Batterien (ISO/DIS 23625:2024)

Petits navires - Batteries lithium-ion (ISO/DIS 23625:2024)

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Petits navires — Batteries lithium-ion

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 188 *Small craft,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 464, *Small Craft*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This edition cancels and replaces the edition (ISO/TS 23625:2021), which has been technically revised.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Small craft — Lithium-ion batteries

1 Scope

This document provides requirements and recommendations for the selection and installation of lithium-ion batteries for boats. It applies to lithium-ion batteries and battery systems with a capacity greater than 500 Wh used on small craft for providing power for general electrical loads and/or to electric propulsion systems. It is primarily intended for manufacturers and battery installers.

WARNING — Lithium ion batteries used in direct current (DC) electrical systems on boats that operate at potentials of 60 V or higher have additional safety requirements not addressed by this standard. Refer to the battery manufacturer's recommendations.

2 Normative references

ISO 13297, *Small craft — Electrical systems — Alternating and direct current installations*

IEC 62133, *Secondary cells and batteries containing alkaline or other non-acid electrolytes — Safety requirements for portable sealed secondary lithium cells, and for batteries made from them, for use in portable applications*

IEC 62619, *Secondary cells and batteries containing alkaline or other non-acid electrolytes — Safety requirements for secondary lithium cells and batteries, for use in industrial applications*

IEC 62620, *Secondary cells and batteries containing alkaline or other non-acid electrolytes — Secondary lithium cells and batteries for use in industrial applications*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
ampere interrupt capacity
AIC
maximum current a circuit breaker or fuse is rated to safely interrupt at a specific voltage

3.2
battery
collection of *cells* (3.8) wired in series (or series/parallel) and constituting a single physical unit

3.3
battery bank
set of *batteries* (3.2) electrically connected (parallel/series) to increase capacity and or voltage

3.4
battery capacity
C
capacity of the *battery* (3.2), expressed in ampere-hours (Ah) at a nominal voltage or in watt hours (Wh), from the manufacturer's specified fully charged to discharged voltage levels

Note 1 to entry: Ah and Wh capacity rating at a given discharge rate or time.

3.5
battery management system
BMS
system designed to protect a lithium-ion *battery* (3.2) from potentially damaging events, such as *overcharging* (3.21) or *overdischarging* (3.22) and high and low temperatures

3.6
battery switch
device rated to disconnect or connect a *battery* (3.2) or *battery bank* (3.3) to a load or another battery or battery bank.

3.7
battery system
battery (3.2) or batteries and all ancillary components

3.8
cell
fundamental building block that is inside a lithium-ion *battery* (3.2) where electrical energy is derived from the insertion/extraction reactions of lithium ions or oxidation/reduction reaction of lithium between the negative electrode and the positive electrode

3.9
C rating
measure of *battery* (3.2) charge and discharge rating expressed as a function of the rated Ah capacity of the battery

EXAMPLE A 100 Ah battery charged or discharged at 100 A is a 1C rate.

3.10
contactor
relay/switch controlled by the *battery management system* (3.5)

3.11
disconnect device
switch controlled by the BMS which disconnects a *battery* (3.2) or *battery bank* (3.3) from charge and discharge sources, and other batteries or battery banks.

3.12
main contactor
in the case of a multiple *contactor* (3.10) system [*high voltage event* (3.14), *low voltage event* (3.16), plus the main disconnection device intended to be the last one to interupt the circuit, or closest to the *battery* (3.2), and, in case of a single contactor system, device intended to serve as *high voltage cutout* (3.13)/*low voltage cutout* (3.15)/main device

3.13
high voltage cutout
HVC
battery management system's (3.5) response to a *high voltage event* (3.14) that protects the *battery* (3.2) from *overcharging* (3.21)

3.14
high voltage event
HVE
condition where a *cell* (3.8) has been charged to a voltage above the manufacturer's cell maximum voltage limit

3.15
low voltage cutout
LVC
battery management system's (3.5) response to a *low voltage event* (3.16) that protects the *battery* (3.2) from *overdischarging* (3.22)

3.16
low voltage event
LVE
condition where a *cell* (3.8) has been discharged beyond the cell manufacturer's cell low voltage limit

3.17
high temperature cut-off
HTC
BMS's response to a *high temperature event (HTE)* (3.18)

3.18
high temperature event
HTE
condition where a *cell* (3.8), parallel string, or bank has a temperature above the manufacturer's maximum cell temperature limit.

3.19
low temperature cut-off
LTE
BMS's response to a *low temperature event (LTE)* (3.20)

3.20
low temperature event
LTE
condition where a *cell* (3.8), parallel string, or bank has a temperature below the manufacturer's minimum cell temperature limit

3.21
overcharging
charging a *cell* (3.8) above the cell manufacturer's upper cell voltage limit, which can result in damage to the cell

Note 1 to entry: Overcharging can result in *thermal runaway* (3.26) or damage to the battery or cells.

3.22
overdischarging
discharging a *battery* (3.2) or *cell* (3.8) below the manufacturer's minimum cell voltage limit

Note 1 to entry: Overdischarging can result in damage to the battery or cells and can include cell polarity reversal.

Note 2 to entry: Subsequent charging after overdischarging can result in *thermal runaway* (3.26).

3.23
readily accessible
capable of being reached quickly and safely for effective use under emergency conditions without the use of tools

3.24
safe operating limits
SOL
set of voltage, temperature and other parameters, within which the *battery* (3.2) is intended to be operated and which, if exceeded, initiates a *battery management system* (3.5) response to correct the problem or to shut the battery down

3.25
state of charge
SOC
indication of the amount of usable capacity available in the *battery* (3.2), expressed as a percentage

EXAMPLE 0 % = empty; 100 % = full.

3.26
thermal runaway
potentially dangerous and self-propagating *battery* (3.2) heating condition that can occur within a *cell* (3.8) or cells

3.27
watertight
constructed so that water will not enter the enclosure under the test conditions specified in IEC Standard 60529, Code IP 67

3.28
weatherproof
constructed or protected so that exposure to the weather will not interfere with successful operation under the test conditions specified in IEC Standard 60529 Type IP 54

4 System design requirements

4.1 Lithium ion batteries and their systems shall be installed in accordance with the requirements of ISO 13297.

NOTE Lithium ion batteries are not subject to routine electrolyte leakage or routine release of gas, therefore requirements regarding electrolyte containment and routine gas ventilation can not apply to lithium ion battery installations.

4.2 Lithium ion battery systems shall be installed, in accordance with the battery manufacturer's recommendations.

4.3 All battery system designs shall be done in a way that ensures all installed lithium-ion batteries are kept within the battery manufacturer's specified safe operating limits.

4.4 There shall be a BMS installed to control all installed lithium-ion batteries and maintain the battery manufacturers specified safe operating limits.

4.5 All battery systems shall have a BMS to provide for battery cutoff if hazardous conditions exist.

NOTE 1 A BMS can be external or internal to the battery.

NOTE 2 In the event of an individual BMS that disconnects, battery bank capacity can be reduced with no notification to the vessel operator.

4.6 Batteries and cells shall be constructed and tested according to a recognised industry standard appropriate for the capacity, mounting location, and mass. These requirements include:

— IEC 62133;